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(54) **METHOD FOR CREATING VIRTUAL BILLBOARDS IN SPORTS FIELDS AND THE LIKE AND  
SUPPORT FOR THEIR REALIZATION**

(57) Method for the creation of virtual advertising hoardings in sports grounds and the like and support for carrying it out.

The method comprises constituting a virtual space corresponding to the sports ground, depicting the field in three dimensions starting from the real measurements and the position of a television camera, proceed-

ing to determine the virtual height of the hoarding by tracing a line from the outer limit thereof to the camera and determining the intersection with the vertical plane, then proceeding to position the desired polygonal or other type of shape, with the proportions of the original hoarding and the height calculated, on the inner limit and obtaining the deformation template by drawing lines from the camera to the hoarding.

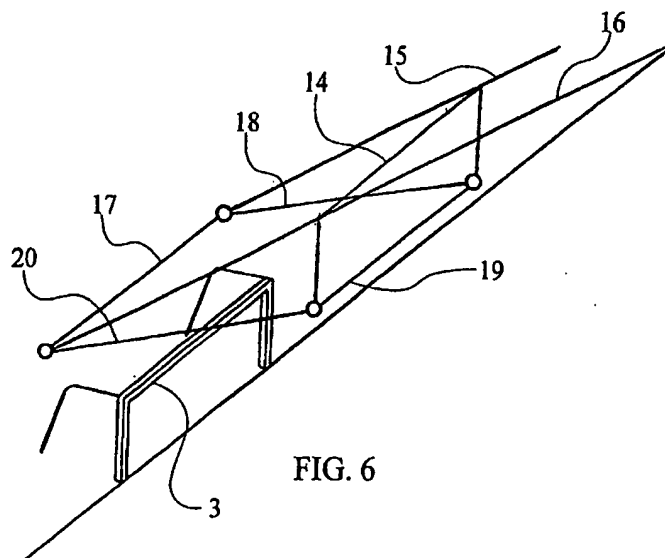


FIG. 6

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## Description

**[0001]** The present invention relates to a method for the creation of virtual hoardings in sports grounds and the like which provides substantial characteristics of novelty and inventive activity. It also refers to a support which allows the method to be carried out.

**[0002]** The aim of the present invention is to provide a method by means of which it is possible to design advertising posters of varying content for their arrangement on flat surfaces, on the playing field or adjacent sites of a sports ground, for example, in the vicinity of the goals of a football pitch, having characteristics such that its display by means of a television camera situated at a fixed point permits the observation of the television image in which said advertising sign or poster, which is arranged, as indicated, on the same flat surface of the playing field, is seen in its correct proportions and position, that is to say, as it would be seen if the poster were standing on the edges of the playing field, creating an effect which is designated in this description as "virtual hoarding". The method of the present invention makes it possible to obtain advertising supports in the form of canvases or the like which, when arranged on the appropriate surface of the playing field, make it possible to obtain an advertising means which is not aggressive in relation to possible impacts of the players, since it does not contain hard parts in the actual support or in the fixing system, also making it possible to produce posters of large dimensions, for example, 10 metres by 10 metres, which can be easily transported and installed, simultaneously allowing rapid dismantling.

**[0003]** In order to fulfil its aims more satisfactorily, the method of the present invention will comprise the production of banners with high strength support grille, for example with threads of 1100 decitex, with PVC coating on two faces and printing with welded paint. Under these conditions, the grille permits the passage of air so that it does not produce the so-called "sail" effect. The fixing system round the banner will preferably consist of impermeable, high strength PVC tubes, each of which is hermetically welded, providing a neck of soft plastic which allows it to be filled with water or some other liquid. These tubular elements give weight to the banner and, more importantly, enable it to be perfectly coupled to the surface intended to receive it, preventing air currents from entering and causing the banner to flap.

**[0004]** According to a variant of the invention, the latter will permit the production of mixed advertising hoardings, that is to say, in part they will comprise the advertising image produced on the flat support and arranged on the flat surface of the playing field and in part will consist of a vertical hoarding of the fence surrounding the pitch, making it possible to effect the correct union of the two advertising images in order to achieve their display as a whole.

**[0005]** The method of the present invention comprises a first phase of creating a virtual field and obtaining

templates on which the field will be depicted in three dimensions, starting from the real measurements thereof and the exact position of the television camera intended to capture the advertising images produced according to the method, since on the exact position of these will depend the precise form of the template which will be obtained. Account will also be taken of the lines which delimit the field and the terraces, which mark the limits between which the advertising panels can be located horizontally, with the graphic images suitably deformed so that they can be displayed as if they were standing.

**[0006]** The virtual height of the hoarding will then be determined starting from the measurements available, tracing a line which passes from the outer limit of the hoarding to the camera, seeking the intersection of this line with a vertical plane or Y-Z plane which will be arranged virtually on the inner limit of the hoarding. By cutting the line L previously traced by the plane X-Y, the virtual height of the hoarding is obtained. The desired shape, polygonal or of other type, can then be located, with the proportions of the original hoarding and the height calculated, on the inner limit.

**[0007]** The hoarding will be positioned in the most convenient place and the deformation template will be obtained by drawing the lines from the point at which the camera is located to the upper corners of the hoarding. These lines will be projected to the plane of the playing field, and the polygon formed by the lower corners of the hoarding and the ends of the projected lines will form the virtual hoarding. It should be considered, therefore, that the deformation template is the projection of the hoarding which it is desired to represent from the geometric point corresponding to the location of the display camera.

**[0008]** Once the shape and dimensions of the deformation template have been obtained, the original hoarding will be adapted to the template obtained in the second phase of the method of the present invention of adaptation of the original hoarding to the deformation template.

**[0009]** In this phase the shape of the original hoarding will basically be transformed into the shape obtained from the projection in three dimensions in the preceding phase.

**[0010]** For this, the original desired shape is converted into the deformation template by means of image processing software. The result obtained is inscribed at the original size with the measurements obtained in the preceding phase and is located on the playing field at the precise co-ordinates stipulated when projection is carried out. Any change of size or position may cause incorrect viewing of the virtual hoarding.

**[0011]** The present invention likewise provides for the creation of virtual hoardings by means of luminous projection, in which case the graphic image of a real hoarding will be projected, on a transparent background, on the sports field in order to be able to trace and inscribe the latter, obtaining the result that what is positioned on

the ground has the same effect as the standing arrangement. Therefore, in a first phase the sign will be projected by means of a light gun which will be placed in the precise location where the television camera will be found, projecting onto the playing field the real projectable sign, produced on a transparent background, proceeding afterwards to the inscription of the virtual hoarding, constituting a pre-inscription which will later be traced for its final positioning on the playing field. In this process, the light gun will be directed towards the point at which it is desired to place the hoarding and will be sized and focused so that it occupies the desired space.

[0012] For greater understanding thereof, drawings illustrating the method of the present invention are appended by way of non-limiting example.

[0013] Figure 1 shows a perspective view of the relative position of the camera with respect to the playing field.

[0014] Figure 2 shows a perspective view which shows the trace of the reference line between the end of the conventional hoarding and the camera.

[0015] Figure 3 shows a detail of the perspective view showing the height of the virtual hoarding.

[0016] Figure 4 shows the positioning of the desired shape, in this case rectangular with the proportions of the original hoarding.

[0017] Figure 5 shows a perspective view with the lines from the camera to the upper corners of the hoarding.

[0018] Figure 6 shows a relative position of the deformation template and the real sign.

[0019] Figure 7 shows a perspective view of the location of the light gun with respect to the real sign.

[0020] Figure 8 shows a detail in perspective of the view in Figure 7.

[0021] Figures 9 and 10 show respective diagrammatic views corresponding to the pre-inscription and the final image of the sign.

[0022] Figure 11 shows a perspective view illustrating the connection of advertising images in the horizontal and vertical plane.

[0023] Figures 12 and 13 are respective plan and sectional views of an advertising support corresponding to the present invention.

[0024] As shown in the drawings, according to the present method the playing field 2 will be depicted on a virtual surface 1 with the measurements of the playing field, positioning the goals indicated by the numbers 3 and 4 and the lines which delimit the field and the terraces 5 and 6. The camera will be located at the point 7 with a well determined mapping according to the three axes, as indicated diagrammatically by the numbers 8, 9 and 10. The virtual height of the hoarding will then be determined on the basis of the measurements available, with which the line L, indicated by the number 11, will be drawn from the outer limit of the hoarding which coincides with the line which delimits the field and the terraces 5, to the camera located at the point 7, seeking

the intersection of this line with a plane Y-Z indicated by 12. By cutting the line 11 as it passes through the plane X-Y the virtual height 40 of the hoarding is obtained. The desired shape 13, Figure 4, will then be located, with the proportions of the original hoarding and the height calculated, on the inner limit 41.

[0025] The hoarding will be positioned in the most convenient place and the deformation template will be obtained by drawing lines from the point at which the camera 7 is located, Figure 5, and the upper corners of the hoarding, which in this case has been represented by the rectangle 14. In Figure 6 can be seen in more detail said lines 15 and 16 which pass through the upper edges of the rectangular figure 14, said lines being extended as far as the playing field, the polygon of the virtual hoarding being obtained, composed of the lower corners of the hoarding and the ends of the projected lines, giving rise to the polygon the sides of which have been indicated by the numbers 17, 18, 19 and 20.

[0026] Once the shape and dimensions of the deformation template have been obtained, the original hoarding will be adapted to the template by converting the original desired shape of the deformation template, determining the different points by means of computer assistance. The result obtained is inscribed at the original size with the measurements obtained in the preceding phase, positioning it on the sports field at the exact coordinates stipulated when projection is carried out. For the production of the virtual hoarding, this can be done by means of a light gun arranged at a point 21 which coincides with the point at which the television camera will be positioned, directing it towards the site where it is desired to place the hoarding and sizing and focusing it so that it occupies the desired space. Figure 7 shows the point 21 where the light gun is positioned, and also the projection of the sign 22 on the strip of ground 23 located between the end 24 of the playing field and the boundary line 25 which constitutes the outer limit. In Figure 8 said production can be seen in greater detail, the arrangement of the projectable sign 26 having been shown diagrammatically.

[0027] Once the desired positioning and scale have been obtained, the surface 22 of the sign is inscribed as shown diagrammatically in Figure 9, in which the sign 27 is represented by a pre-inscribed tracing 28. The pre-inscribed tracing will subsequently be transformed into a final inscription 29 starting from the pre-inscription.

[0028] The method of the present invention makes it possible to effect the correct joining of one part of the sign, situated on the playing field, with another part situated on a vertical hoarding, as shown in Figure 11, in which can be seen the sign 30 which carries part of the advertising image 31 and which is arranged on the surface of the playing field, being joined to the vertical hoarding 32, on which the remainder of the graphic image 33 is arranged.

[0029] The present invention likewise comprises the concrete embodiment of the support for the advertising

image or sign which will be placed on the playing field with special characteristics for rendering it stable without harmful effects being produced by the action of the wind. For this, as shown in Figures 12 and 13, provision is made for the formation of a frame consisting, for example, of four sides in the case of a rectangular inscription, which have been indicated by the numbers 34, 35, 36 and 37. Said sides preferably consist of tubes of impermeable, high strength PVC which have dimensions of approximately 15 by 3 cm. Each of said sides will be hermetically welded and will have a filling neck, as shown by 38 for the side 34, which will allow filling with water or some other liquid, by means of which a significant stability of the sign will be obtained, coupling it on the surface of the playing field and preventing the effects of wind. The body of the support or sign 39 will preferably be produced in a high strength 1100 decitex support grille with PVC coating on two faces and printed with welded paint.

#### Claims

1. Method for the creation of virtual advertising hoardings in sports grounds and the like and a support for carrying it out, **characterized in that** it comprises a first phase of constituting a virtual space corresponding to the sports ground, depicting the field in three dimensions starting from the real measurements and the position of a television camera intended to display a graphic image arranged horizontally on the playing field, which it is desired to display as if it were standing, indicating on the virtual reproduction of the playing field the lines which delimit the field and the terraces, which are inner and outer limits for the advertising images, proceeding to determine the virtual height of the hoarding by tracing a line from the outer limit thereof to the camera and determining the intersection with the vertical plane which passes through the inner limit of the hoarding and cutting said line at its intersection through the horizontal plane, then proceeding to position the desired shape, with the proportions of the original hoarding and the height calculated, on the inner limit, positioning the hoarding in a convenient place and obtaining the deformation template by drawing lines from the camera point to the upper corners of the hoarding, projecting the lines to the playing field, so that the polygon of the virtual hoarding is determined, transforming the original shape into the deformation template.
2. Method for the production of virtual advertising hoardings in sports grounds and the like, according to claim 1, **characterized by** the arrangement of a light gun at the place where the television camera will be positioned, directing it towards the point where it is desired to place the advertising image horizontally, sizing and focusing it so that it occupies the desired space, projecting the advertising image produced on a transparent support on the area of the virtual hoarding on which there will be exhibited directly or traced a pre-inscription transformed subsequently into the advertising image of the final sign.
3. Support for carrying out the method of claims 1 and 2, **characterized in that** it comprises a high strength grille laminar body supported by a frame consisting of tubes of a flexible plastics material bearing individual means for filling them with a liquid.
4. Support according to claim 3, **characterized in that** the laminar body carrying the graphic image comprises a 1100 decitex grille.
5. Support according to claim 3, **characterized in that** the support for the advertising image is coated with PVC on two faces and printed with welded paint.
6. Support according to claim 3, **characterized in that** the sides of the frame consist of individual tubes of PVC hermetically welded and provided with individual necks for filling them with a liquid.

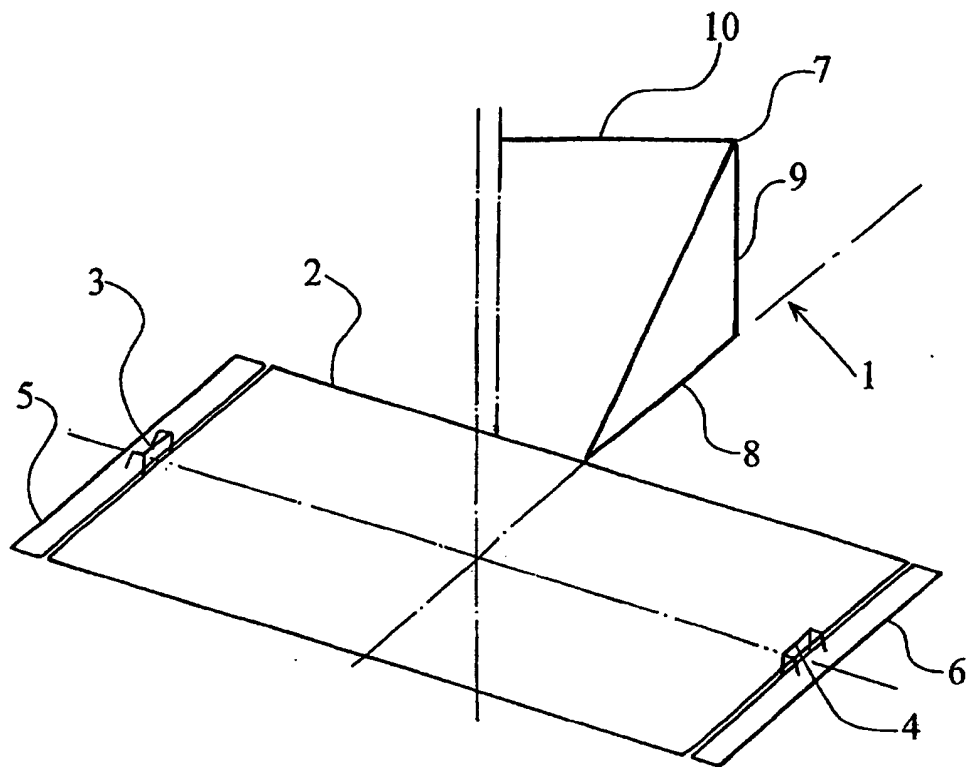


FIG. 1

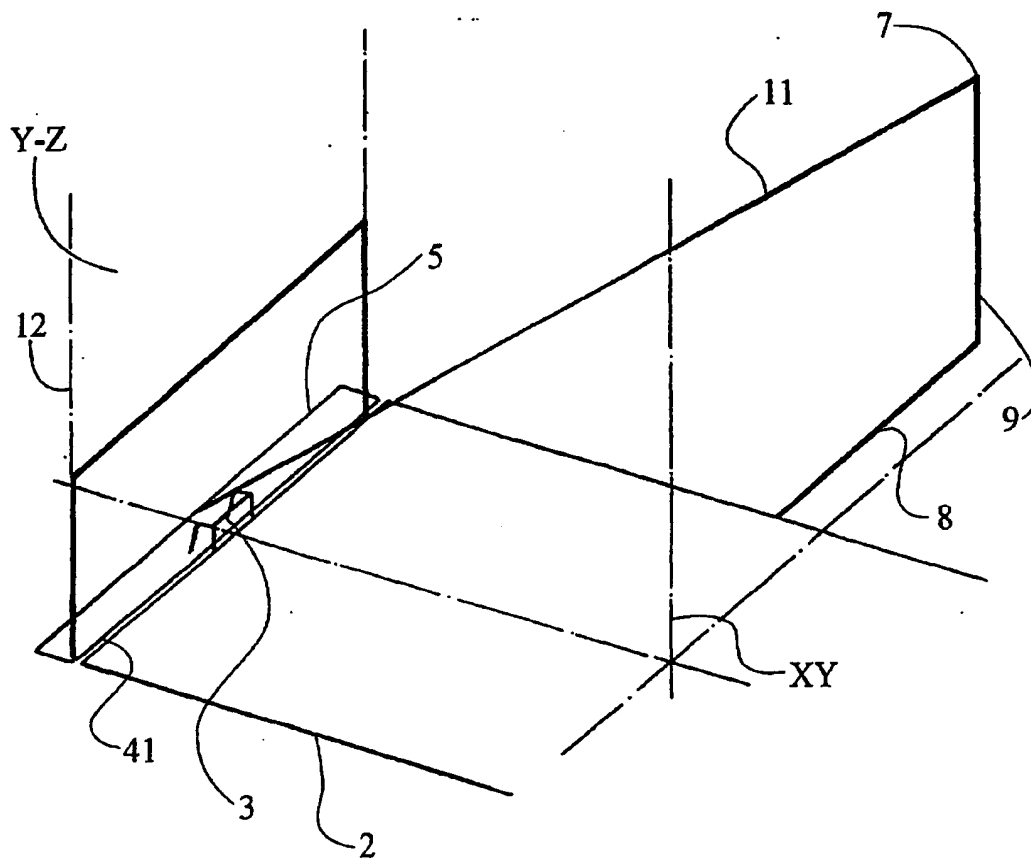


FIG. 2

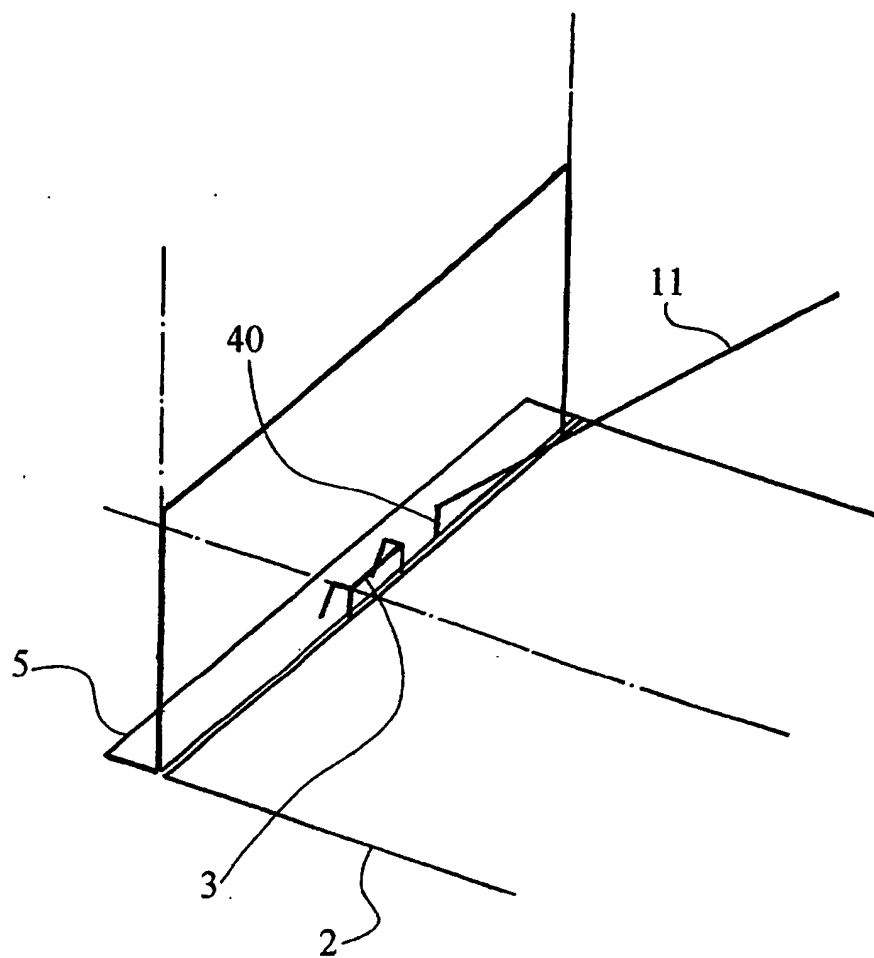


FIG. 3

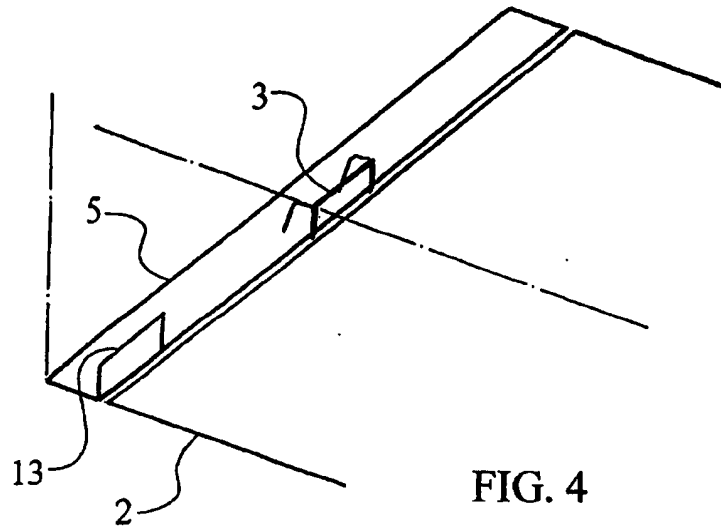


FIG. 4

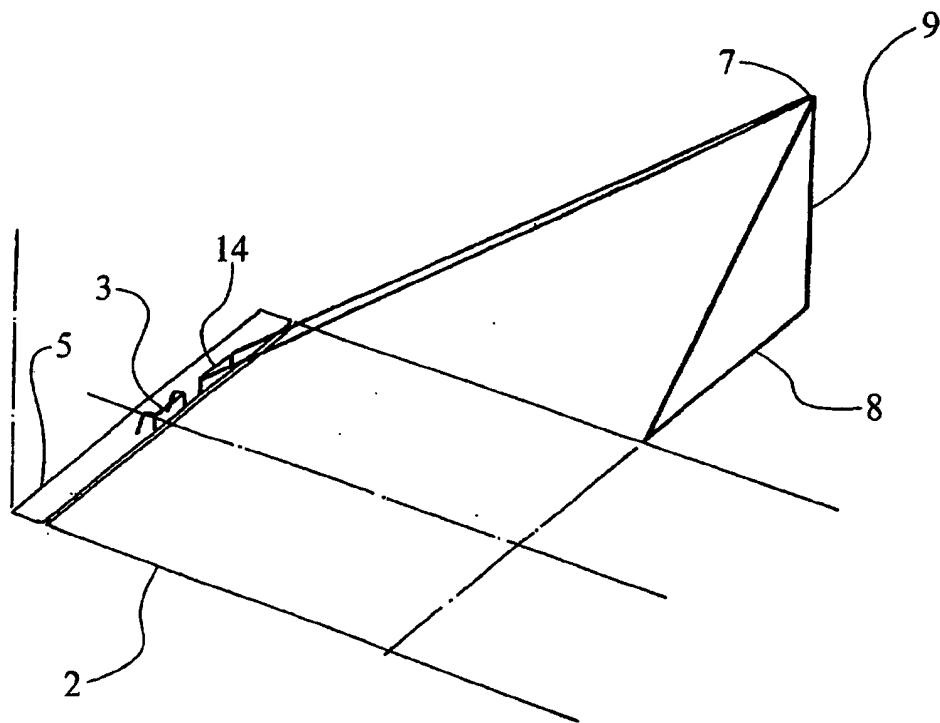


FIG. 5



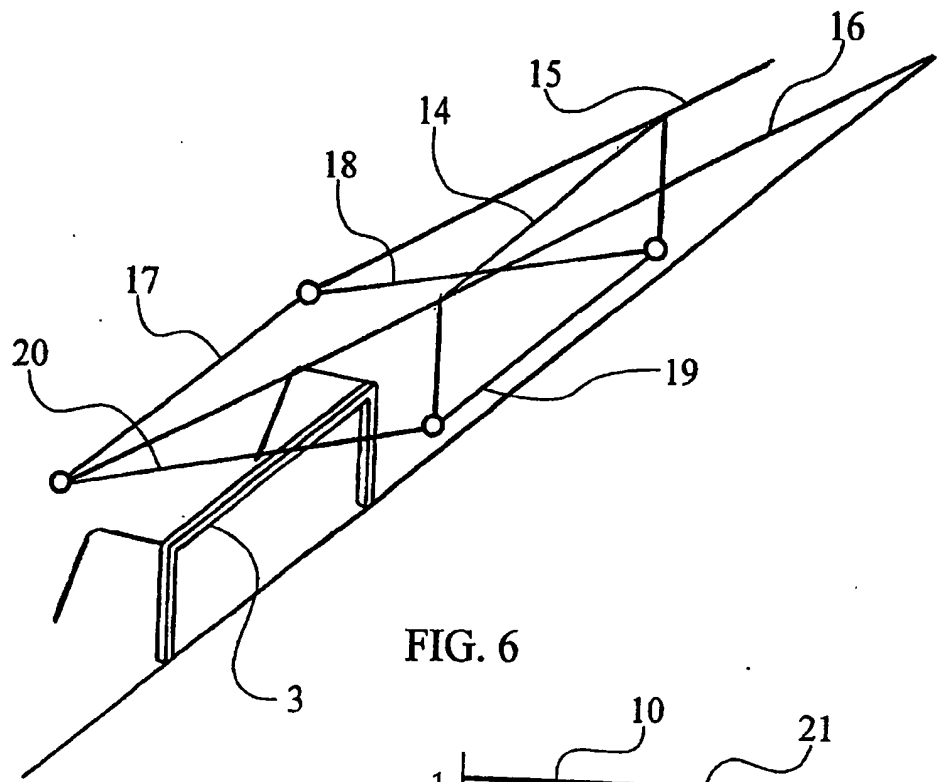


FIG. 6

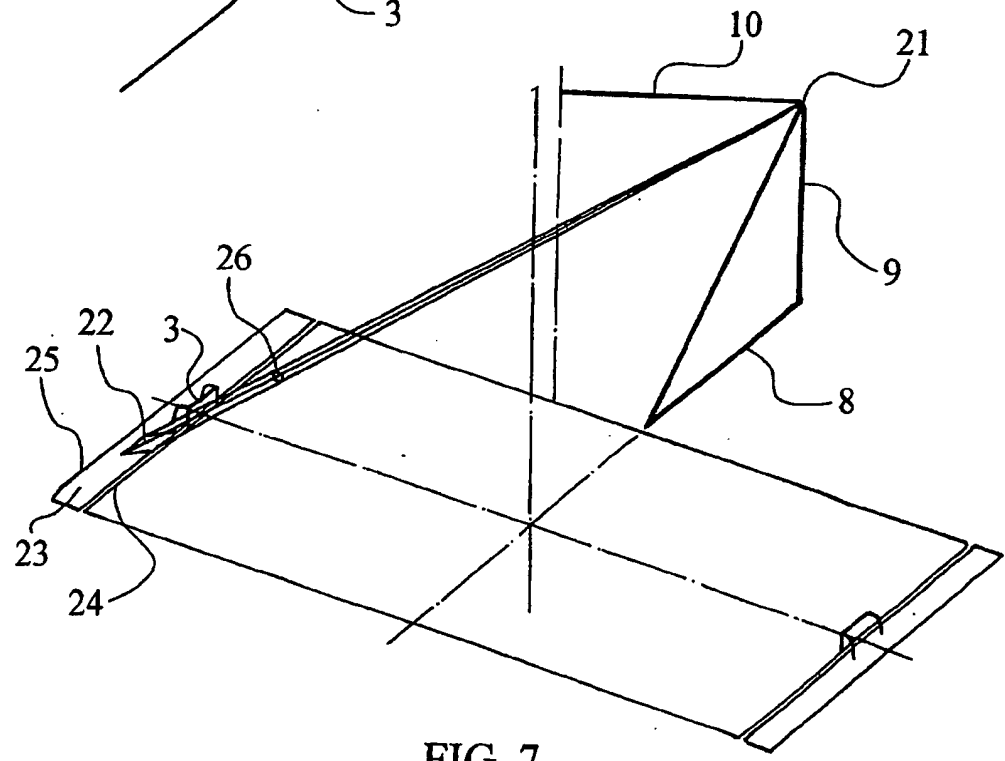
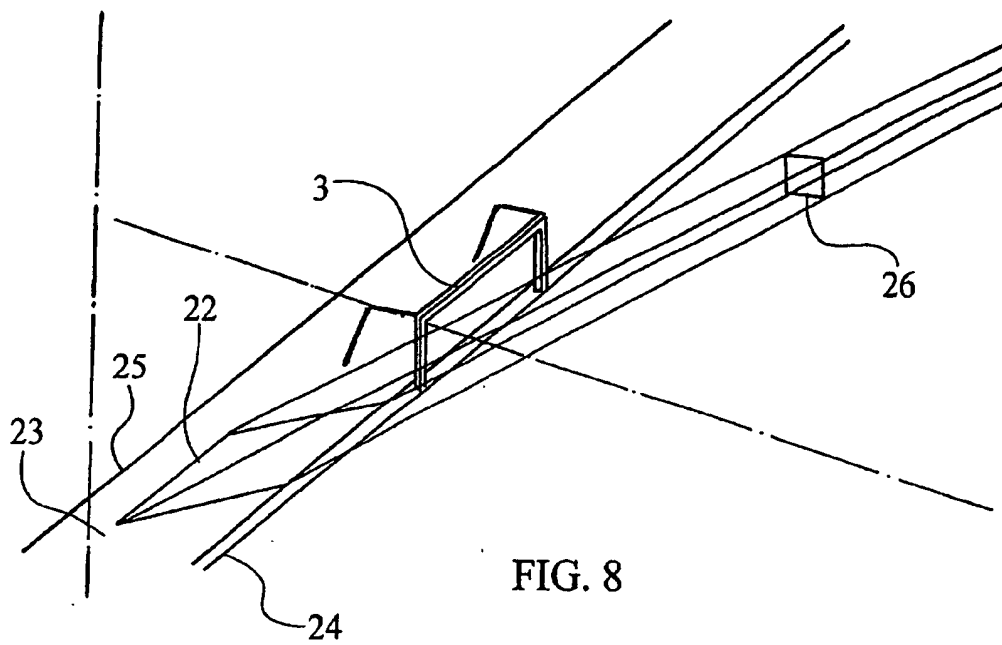


FIG. 7



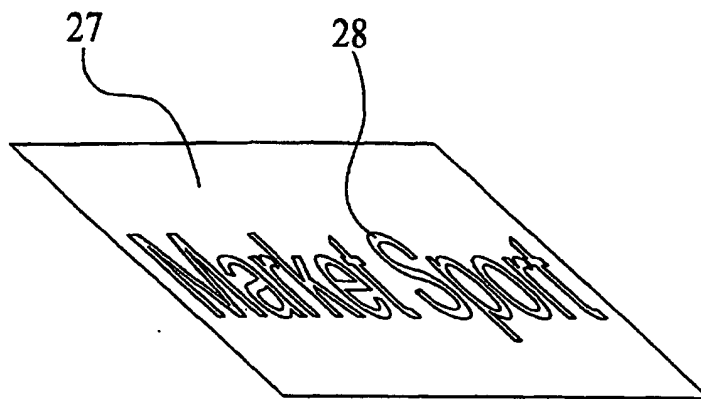


FIG. 9

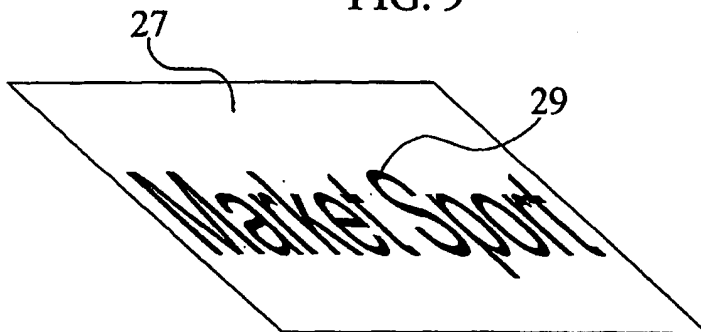


FIG. 10

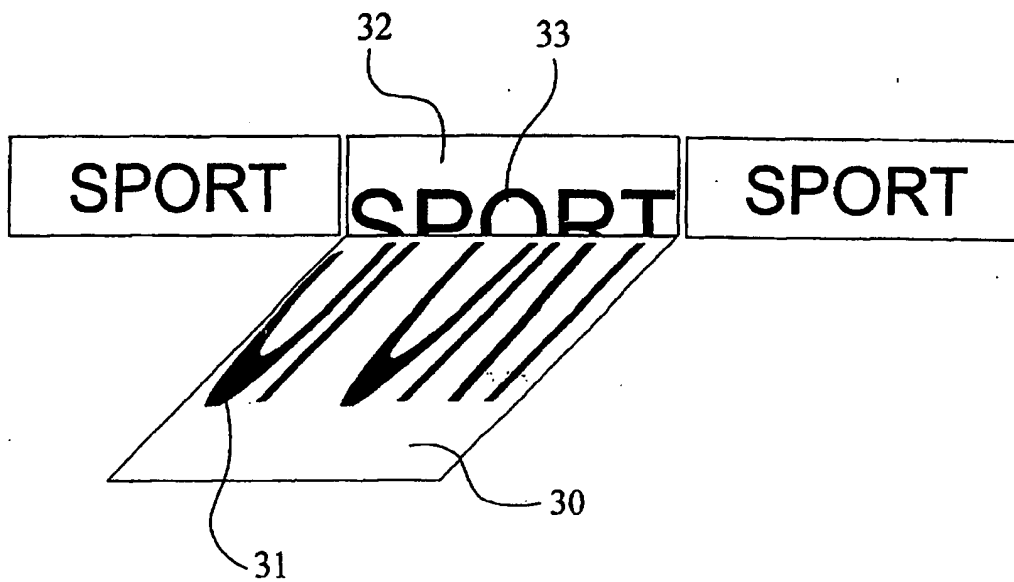
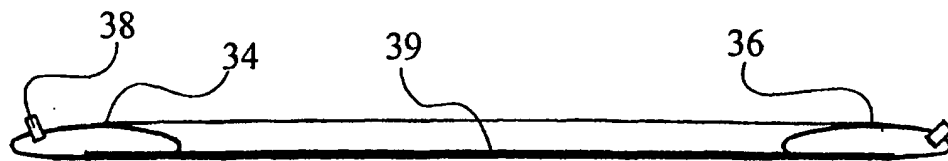
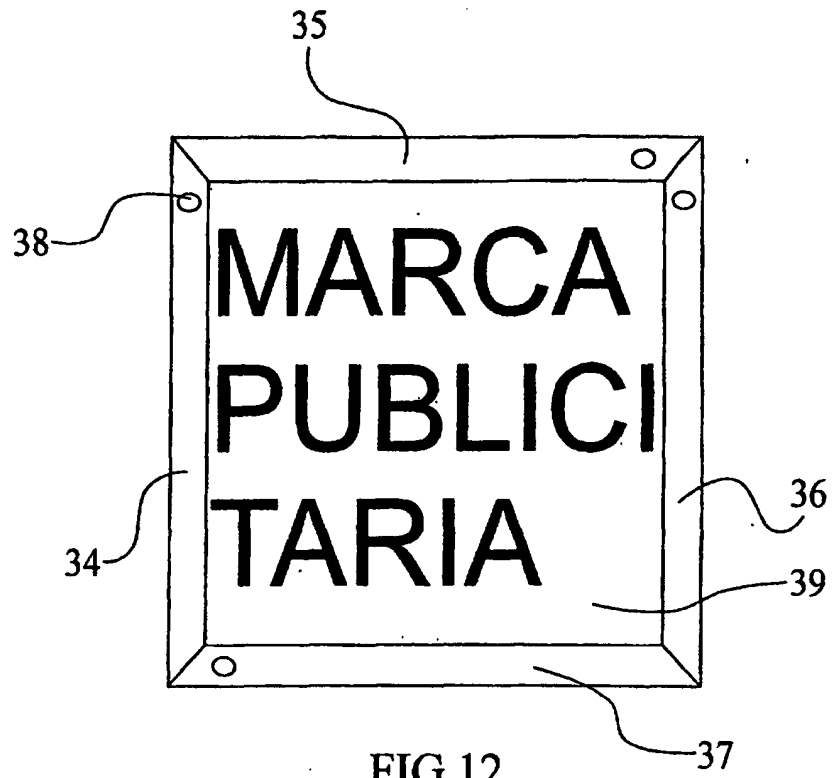


FIG. 11



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/ES 00/00080A. CLASSIFICATION OF SUBJECT MATTER <sup>6</sup>:

IPC7 : G09F1/02, G09F1/10, G06T3/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 : G09F, G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, PAJ, CIBEPAT

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9843231 A (LOGO PAINT) 01 October 1998 (01.10.98) page 1, line 19- page 2, line 5; figure 1	1
A	WO 9304559 A (RICHMAN) 04 March 1993 (04.03.93) See the whole document	1
A	ES 2114819 A (MARKET SP'94) 01 June 1998 (01.06.98) See the whole document	1
A	US 5534340 A (GUPTA et al) 09 July 1996 (09.07.96) the abstract	4



Further documents are listed in the continuation of Box C.



See patent family annex.

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"A" document member of the same patent family

Date of the actual completion of the international search  
07 april 2000 (07.04.00)Date of mailing of the international search report  
12 April 2000 (12.04.00)Name and mailing address of the ISA/  
European Patent Office  
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/ES00/ 00080

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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ES 2114819 A1	01.06.1998	EP0810780 A BR9703340 A	03-12-1997 17-11-1998
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Form PCT/ISA/210 (patent family annex) (July 1992)